

Keyhole coring and replacement: the right solution for right-of-way owners

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It's a fact of life for every right-of-way (ROW) owner: At some time or another, there will be a need for repairs to the utility infrastructure under your roadways. More and more ROW owners—as well as utilities and their contractors—are finding that keyhole coring and replacement is the best solution for everything from the simplest daylighting to exposing the utility to major line replacements. They all agree: Coring is a better, smarter, and environmentally sensitive way to make and repair utility cuts through pavement.

Yet, even with all this awareness of the benefits of keyhole coring, many natural gas and other utilities are still working with their various jurisdictions to gain the approvals needed to use this pavement excavation and restoration procedure.



Coring the pavement and using round road plates (foreground) to temporarily cover the excavation

What is keyhole coring?

Keyholing is the process of making a small, precisely controlled hole in the roadway for “daylighting,” or uncovering and exposing underground utilities and pipelines, in order to locate or inspect them or to perform repairs, maintenance or installations. Keyholing is not new. In fact, specialty contractors have been using the keyholing process for more than 40 years.

In the early 1990s, pavement coring and replacement—an even more efficient method of cutting and restoring pavement cuts—was implemented for use in conjunction with vacuum excavation. *Keyhole coring* involves cutting a cored hole (with core diameters averaging from 6 to 24 inches) in the roadway pavement to open the street surface and perform repairs with spe-

cialized long-handled tools. Following the utility locates or repair activities, the *reinstatement* process begins. Workers use a specifically formulated bonding material to replace the previously removed road surface.

Keyhole technology gaining traction with ROW owners

Since the use of keyhole coring began, more than 50,000 cores have been cut and reinstated throughout North America, with most of them performed by natural gas utilities. Gas Technology Institute (GTI), a nonprofit research and development organization serving the natural gas industry, is working with many natural gas utilities to gain approval for the coring process from mu-

nicipalities and other highway authorities and departments of transportation.

Recently, GTI supported the efforts of Nicor Gas, a natural gas utility serving the northern third of Illinois, to gain formal approval for keyhole coring on Illinois state rights-of-way from the Illinois Department of Transportation (IDOT).

Because more and more city and state ROW owners are realizing the benefits that keyhole coring offers their roadways and their constituencies—less damage, greater convenience, time and cost savings, to name a few—they have been approving the use of the keyhole coring process in greater numbers and in many forms, from

pilot programs to formal city and state procedures. (See sidebar on p. 78 for a list of many ROW owners who have provided some form of acceptance.)

Specifications are being developed by many ROW owners. In 2007, the City of Toronto established the first keyhole coring standard in North America, the result of 20 years of keyhole activities by local utility Enbridge Gas Distribution and several efforts by GTI. The standard (Construction Specification for Keyhole Excavation and Permanent Reinstatement of Keyhole Cores) applies to all keyhole excavations in which a circular hole is cored through roadway pavement or sidewalks using coring equipment.

Today, many municipalities actually encourage—even mandate—use of the keyhole coring process. One of the municipalities that mandates the use of the keyhole coring process is Overland

Park, Kansas. A suburb of Kansas City and the second largest city in Kansas, Overland Park is the home of Sprint's worldwide campus and a population of approximately 170,000 people. The city encompasses 1,680 lane miles with a public works budget of more than \$20 million. The City owns the storm sewer system, streetlight and signal systems, and fiber optic network.

"In Overland Park, utility companies have not yet employed the keyhole process for repairs to their own facilities," says Murvyn Morehead, Overland Park's Right of Way Manager. "Yet, because of the reduced excavation impacts [from the use of keyhole coring], we now mandate that any utility exploration efforts on any city street must employ the coring process."

Benefits for utilities

The results of keyhole projects have been so promising that utilities and

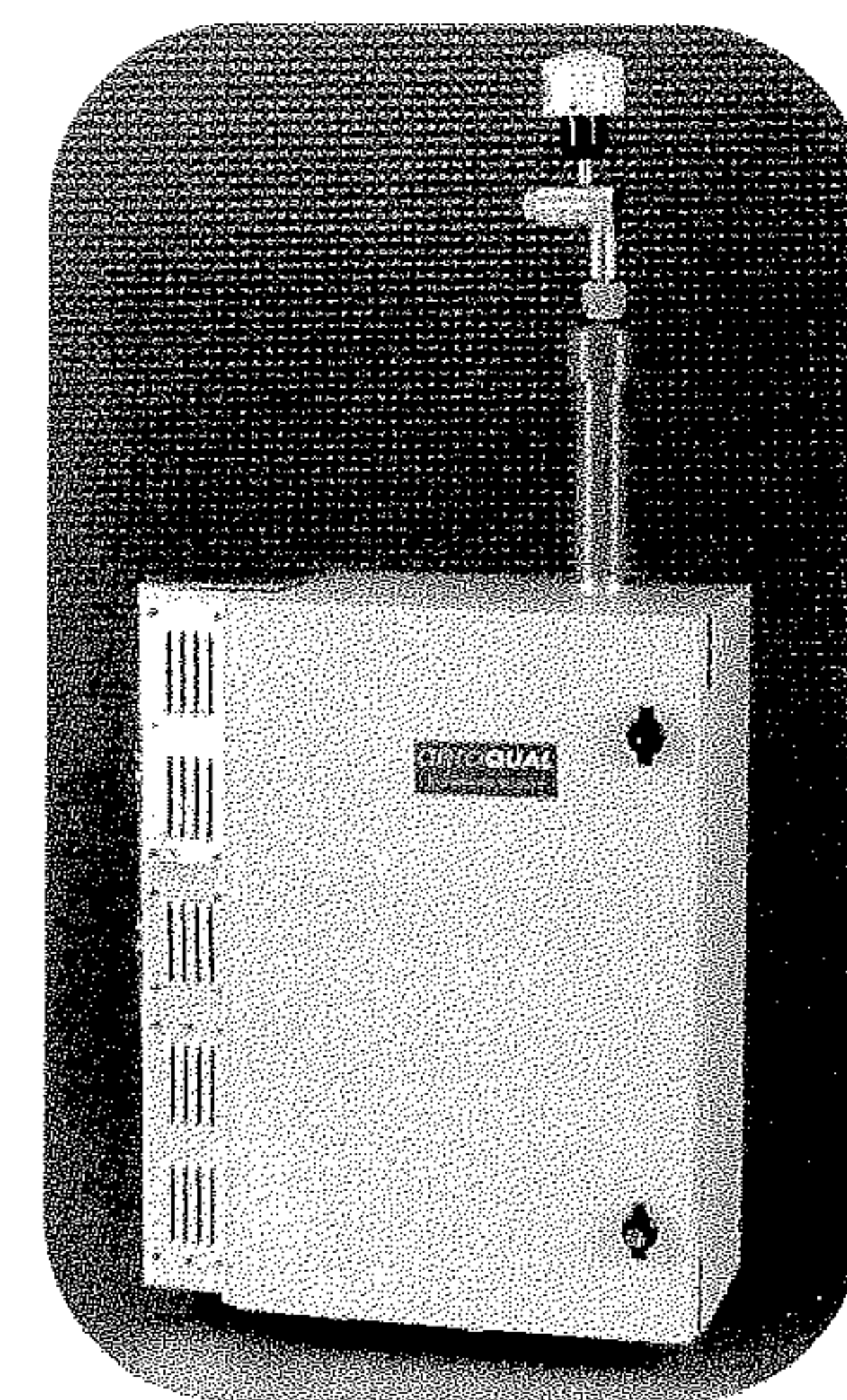
their contractors are jumping on the keyhole coring bandwagon in greater numbers. And with good reason—after all, the benefits of keyholing for utility operations are considerable. Not only does it save money and time, it enhances worker safety. Because workers operate at the street rather than down in excavated pits, there's no risk of injury from sidewall cave-ins. In addition, utilities realize significant savings on street restoration and call-backs due to poor street restoration.

PECO, the former Philadelphia Electric Company, has played a long and successful role in the evolution of the keyhole process, having helped develop the "small-hole" work as long ago as the 1960s. More recently, PECO made a significant investment in vacuum equipment and other technology needed to launch a dedicated keyhole implementation effort. Working with

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technology providers and GTI during a recent pilot program, PECO was instrumental in testing modular equipment for coring and vacuum excavation and developing new solutions to improve the productivity of utility crews performing this important work.



Minimal impact method of locating buried utilities

Keyhole technology continues to advance

With its proven 10-year track record of developing engineering reports and test data to support the use of the keyhole coring process, GTI has been helping utilities develop and test all aspects of the keyhole technology set for overall viability and cost savings. As a result of the efforts of GTI and its technology and natural gas utility partners, more infrastructure repairs and installation processes are being developed every year. Street coring and vacuum excavation equipment are improving to provide better operator ergonomics and improved operation throughout seasonal changes.

Urban benefits

Overland Park is already experiencing many of the benefits that have been realized by other ROW owners in urban environments.

First, of course, it's good for the road, because smaller cuts mean less damage. Precision core cutting prevents collateral damage, with no damage from backhoes, jackhammers or overcuts from concrete saws. "The loss of confining stresses—or loss of

lateral support that allows trench walls to sag into a new opening—that typically occurs with an open trench cut is significantly reduced or eliminated," Morehead says. The circular geometry of the process eliminates corner stress cracks. And there is no need for temporary patching, because the replaced core matches the composition of the original road.

It's good for the motoring public, too. With reductions in repair time resulting in fewer lane closures and other impediments to traffic flow, drivers are happier. And, should the core hole "need to be left open for an extended period of time," Morehead continues, "it can be covered with a small steel plate that can be easily placed by one worker and, once in place, is virtually impossible to move accidentally. So, if the core can be drilled out of the normal wheel path of vehicles, there is no contact between the cover plate and the vehicle and no 'banging' noise normally associated with a vehicle driving over a full-sized street plate."

The "green" benefits of keyhole technology

The benefits of the keyhole process can also translate into significant benefits for the environment.

Use of the keyhole process conserves energy and resources. Because it reuses the original core of the pavement to restore the pavement opening when the process is complete and no temporary patching is needed, it uses no virgin paving materials and leaves a small carbon/energy footprint.

It reduces pollution. With few and quicker road repairs, there are shorter and fewer road closings, resulting in less wasted fuel and lower exhaust levels. The coring process creates no dust, air quality is improved and the impact on neighbors is reduced. And, because there is no need for large backhoes, dump trucks, or jackhammers, the keyhole work zone experiences much

less noise pollution than traditional repair sites.

Keyhole coring: the time is now

Infrastructure management through the use of small-hole technology like keyhole coring is a process whose time has come. With the advantages it offers to utilities and ROW managers, it should be seriously considered and implemented as a critical solution for the 21st century.

The authors will give a presentation on this topic at the 2009 APWA Congress in Columbus, Ohio. Their session is entitled "Keyhole Technology – Pavement Micro-Surgery" and takes place on Sunday, September 13, at 2:00 p.m. Murvyn Morehead can be reached at (913) 895-6189 or Murvyn.Morehead@opkansas.org; Dennis Jarnecke can be reached at (847) 768-0943 or dennis.jarnecke@gastechnology.org; and T. Mark Andraka can be reached at (215) 841-6485 or mark.andraka@peco-energy.com.

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Keyhole Coring: Gaining Approvals across North America

Following are just a few of the municipalities, departments of transportation, and other highway ROW authorities that currently approve or encourage use of the KCR process for roadway excavation.

- City of Dallas Public Works and Transportation Department
- City of Detroit
- City of New York Department of Transportation (DOT) – pilot
- City of Portland
- City of Toronto
- Illinois DOT
- Maryland DOT
- Montgomery County
- Pennsylvania DOT
- Prince Georges County
- And many more!